

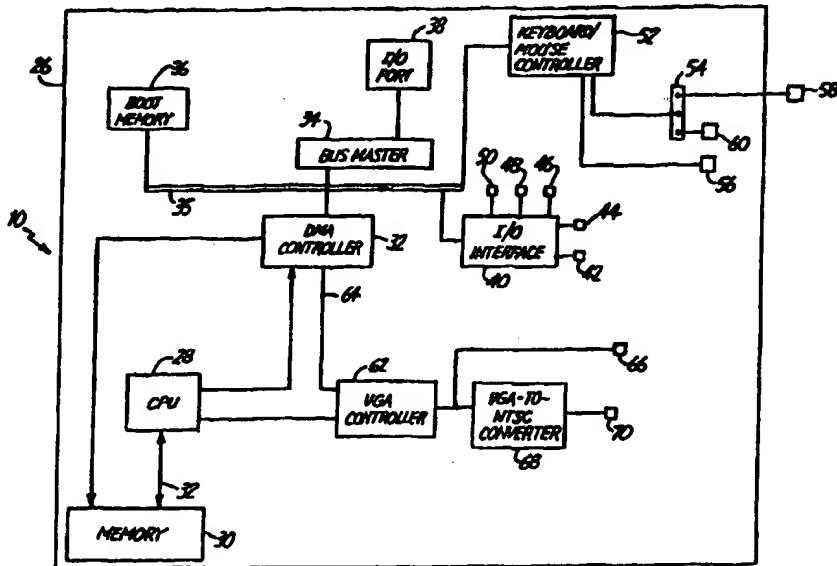


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(54) Title: SET-TOP COMPUTER



(57) Abstract

A set-top computer (10) (suitable for use with one of a television (12) and monitor) includes a motherboard (26) having various components integrally disposed thereon. A VGA controller (64) is integrally disposed on the motherboard (26) and provides a VGA signal output. A VGA to NTSC converter (68) is integrally disposed on the motherboard (26) and is coupled to the VGA controller (64) to provide an NTSC output based on the VGA signal. An infra-red receiver (58) is integrally disposed on the motherboard (26) and receives infra-red information and provides that information to the computer (10). System boot memory (36) is integrally disposed on the motherboard (26) for sustaining a system boot. System application memory (30) is integrally disposed on the motherboard (26). A plurality of input/output ports (38) are also integrally disposed on the motherboard (26).

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SET-TOP COMPUTER

BACKGROUND OF THE INVENTION

The present invention relates to computers. More particularly, the present invention relates to a set-top computer for use with a television set, computer monitor, or both.

Today's home computer is generally found in a den or home office. Such a computer usually comprises a monitor, a case or housing, a keyboard, and a mouse. Within the case, there usually exists a vast array of components such as a motherboard, central processing unit (CPU), power supply, system random access memory (RAM), hard drive, floppy drive, VGA adaptor, input/output controllers, and various other expansion peripherals. This typical system boots from a hard disk in the hard drive, and in the event of a hard disk failure boots from a floppy disk in the floppy drive. The myriad components within the case, and the monitor itself all add to a substantial purchase price for the entire system. Therefore, conventional home computer systems represent a significant purchase for an average household.

Computer and integrated circuit technology is moving forward at an increasingly quicker rate. Computer manufacturers compete with one another to develop and market faster and less expensive computers with higher throughput and greater accuracy. However, given the pace of technological development, even the fastest systems are soon bested by yet another faster and less expensive system. In this environment, consumers have become aware that if they wait, they will be able to buy a cheaper, faster system than is currently on the market. They have also become aware

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that as soon as they purchase a computer system, the system begins to become obsolete. Even systems that are said to be upgradable, are nonetheless quickly outpaced by technology and rendered obsolete.

5 Set-top computers are argued to be the next generation of home computer. Set-top computers reduce cost by providing a video signal directly to a household's television (televisions with the capability of receiving such a signal are almost universally present in any given household). This aspect alone saves the cost of purchasing a computer monitor. In addition, using a television as a computer display allows for a much larger display because for example a 10 25 inch television generally costs only one third to one fourth the cost of a 21 inch computer monitor. As a result, most home computers use a 14 inch monitor. Therefore, more people can generally participate in the 15 operation of a set-top computer than could crowd around a 14 inch monitor. Thus, the set-top computer is more appropriate for interaction with an entire family than 20 is the traditional home computer.

Currently, set-top computers do not yet represent the ideal home computer. For example, many 25 still use various discrete components within the set-top computer housing itself. This increases the cost of such a computer because assembly costs are greater, and it also adds to the physical size of the set-top computer. While the physical size of the conventional 30 home computer may not be of the utmost importance in a home office or den, the set-top computer is desirably small and unobtrusive because it generally resides near a television in a living area of a household.

Yet another problem with conventional set-top computers is the fact that when operating a set-top

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computer, the user may generally be sitting in whatever furniture is disposed in front the television while cables to the various input means (i.e., keyboard and mouse) extend from the user to the computer across the 5 floor of the living area. Such an arrangement is not only cumbersome but, it increases the possibility that a pet or young child will trip over the cables and become injured, or cause damage to the unit itself.

SUMMARY OF THE INVENTION

10 A set-top computer (suitable for use with one of a television and monitor) includes a motherboard having various components integrally disposed thereon. A VGA controller is integrally disposed on the motherboard and provides a VGA signal output. A VGA to 15 NTSC converter is integrally disposed on the motherboard and is coupled to the VGA controller to provide an NTSC output based on the VGA signal. An infra-red receiver is integrally disposed on the motherboard and receives 20 infra-red information and provides that information to the computer. System boot memory is integrally disposed on the motherboard for sustaining a system boot. System application memory is integrally disposed on the motherboard. A plurality of input/output ports are also integrally disposed on the motherboard.

25 BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top perspective view of a set-top computer system according to the present invention.

FIG. 2 is a block diagram of the components of 30 a set-top computer in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 is a top perspective view of a set-top computer system in accordance with the present invention. Set-top computer 10 generally resides on or

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near a conventional television set 12, and is coupled to television set 12 as described in greater detail below with respect to FIG. 2. Couch 14 is preferably disposed in front of television 12 such that users sitting on couch 14 are able to view television 12. Infra-red keyboard 18 and infra-red mouse 22 are shown disposed on top of a conventional table 16. Of course, infra-red mouse 22 could also be a track ball mouse integrated into keyboard 18. Table 16 is located such that a user sitting on couch 14 is able to manipulate both keyboard 18 and mouse 22.

Keyboard 18 emits infra-red radiation pulses to set-top computer 10 in response to and based upon keystroke information input by a user (not shown in FIG. 1). Likewise, mouse 22 also emits infra-red radiation pulses in response to and based upon user input thereto.

Set-top computer 10 includes an infra-red receiver which receives the infra-red signals transmitter by keyboard 18 and infra-red mouse 22 and performs functions based on instructions indicated by the infra-red signals received.

FIG. 2 is a block diagram of set-top computer 10. Set-top computer 10 preferably includes motherboard 26, CPU 28, memory 30, DMA controller 32, bus master 34, ISA bus 35, boot memory 36, input/output (I/O) port 38, I/O interface 40, floppy disk connector 42, IDE connector 44, printer port 46, communication ports 48, 50, keyboard/mouse controller 52, infra-red receiver 58, VGA controller local bus 64, and VGA-to-NTSC converter 68.

In the preferred embodiment, all of the components shown in FIG. 2 are integrally disposed on motherboard 26 which is preferably a multi-layer printed circuit board. By embedded in, integrally disposed on,

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or integrally mounted to, it means that the components are soldered directly to motherboard 26 or connected by a chip socket which is soldered to motherboard 26 and not provided as separate components connected to motherboard 26 through, for example, a releasable connector. CPU 28 is embedded in, integrally disposed on, motherboard 26, and is preferably an Intel 80486DX4 processor. System application memory 30 is integrally disposed on motherboard 26 and is coupled to processor 28 such that processor 28 may write to and read from memory 30. Such bidirectional communication is illustrated by arrow 32. System application memory 30 includes 1 megabyte of dynamic random access memory (DRAM) integrally disposed on the motherboard 26, and a single in-line memory module (SIMM) expansion connector also integrally disposed on motherboard 26 for allowing system application memory to be expanded through the addition of conventional SIMM integrated circuits.

Direct memory access (DMA) controller 32 is preferably embodied as a commercially available chip set from Chips and Technologies of Sunnyvale California. DMA controller 32 receives signals from CPU 28, and provides independent system application memory access to various other system devices as will be shown. Such access allows for faster data transfer rates than would be possible through CPU 28 alone. ISA bus master 34 is also integrally disposed on motherboard 26. Bus master 34 is coupled to DMA controller 32 such that devices coupled to the ISA bus 35 may take advantage of direct memory access.

System boot memory 36 is also integrally disposed on motherboard 26. Boot memory 36 is preferably coupled to ISA bus 35, and provides instructions for a system boot in the absence of

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overriding instructions from an optionally connected hard disk drive or floppy disk drive. System boot memory 36 is preferably 2 megabytes of Flash memory which allows for the use of embedded or down-loadable 5 computer application programs. Although the preferred embodiment has boot memory 36 coupled to ISA bus 35, the invention could be practiced without such a connection provided that a separate bus were provided to couple the boot memory to the system.

10 Input/output port 38 is also preferably integrally disposed on motherboard 26, and is coupled to ISA bus master 34. Input/output port 38 allows a vast array of industry standard expansion peripherals to be coupled to computer 10 for providing enhanced 15 capabilities, such as an internal telephone modem or any other suitable expansion peripheral.

In one preferred embodiment input/output interface 40 is commercially available as a chipset from Chips and Technologies in Sunnyvale, California, and is 20 also integrally disposed on motherboard 26 and coupled to ISA bus 35. Input/output interface 40 includes a floppy disk interface which provides floppy disk connector 42, and fixed disc/CD-ROM (compact disk read only memory) interface which provides IDE connector 44. 25 IDE connector 44 is coupleable to any suitable IDE device including IDE fixed disc drives, and CD-ROM drives. Input/output interface 40 also includes printer port 46 which is preferably a parallel printer port coupleable to a suitable printer. Finally, input/output 30 interface 40 provides serial communication (COM) ports 48 and 50. COM ports 48 and 50 are suitable for attaching a wide array of external serial devices (including an external modem) to set-top computer 10.

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Keyboard/mouse controller 52 is also integrally disposed on motherboard 26 and is coupled either to ISA bus 35 directly or through an appropriate portion of interface 40 or DMA controller 32.

5 Controller 52 receives a keyboard input signal from jumper 54 and a mouse input signal from mouse port 56 which preferably receives mouse signals from a PS/2 mouse. Jumper 54 allows one of infra-red receiver 58 and PS/2 keyboard port 60 to be selectively coupled to

10 input receiver 52. It should be noted that although in one preferred embodiment infra-red receiver 58 is shown disconnectably connected to motherboard 26, it may also be integrally disposed on motherboard 26. Additionally, it should be noted that although the preferred

15 embodiment refers to a PS/2 mouse and the PS/2 keyboard, the invention may be practiced with any suitable mouse and keyboard.

Video Graphics Array (VGA) controller 62 is integrally disposed on motherboard 26 and is coupled to

20 CPU 28, and DMA controller 32 through local bus 64. VGA controller 62 provides a video output signal based upon signals from CPU 28 and DMA controller 32. Local bus 64 provides enhanced data transfer capabilities over non-local bus connections, and is preferably a VESA-type

25 bus. It should be noted, however, that with other faster CPUs which may be employed to practice the invention, other local bus standards may be appropriate. VGA controller 62 provides a video output signal to monitor port 66, and VGA to NTSC converter 68. VGA to

30 NTSC converter 68 is integrally disposed on motherboard 26 and receives a VGA signal from VGA controller 62, and converts it to an NTSC signal suitable for output to a standard television. The NTSC signal from VGA to NTSC

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converter 68 is provided to television output port 70 on motherboard 26.

Thus, the present invention provides a highly functional computer system for only a fraction of the 5 cost of conventional computers. By embedding a significant portion of the functional components on the motherboard, costly space and assembly time are drastically reduced. Further, by providing a very small housing adapted for conventional television set, the 10 present invention enhances the viewing characteristics of the system while simultaneously greatly reducing the cost of the system to the consumer. Meanwhile, the present system provides appropriate connectors so that substantially enhanced levels of functionality can be 15 obtained by simply adding additional componentry, such as a modem for international access or other componentry.

Although the present invention has been described with reference to preferred embodiments, 20 workers skilled in the art will recognize that changes may be made in form and detail without departing from the spirit and scope of the invention.

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WHAT IS CLAIMED IS:

1. A set-top computer for use with one of a television and monitor comprising:
 - a motherboard;
 - a controller integrally disposed on the motherboard;
 - a VGA controller integrally disposed on the motherboard, for providing a VGA signal output;
 - a VGA to NTSC converter integrally disposed on the motherboard, coupled to the VGA controller, to provide an NTSC output based on the VGA signal;
 - an infra-red receiver for receiving infra-red information and providing the information to the controller;
 - system boot memory integrally disposed on the motherboard and coupled to the controller for sustaining a system boot;
 - system application memory integrally disposed on the motherboard and coupled to the controller; and
 - a plurality of input/output ports integrally disposed on the motherboard and operably coupled to the motherboard.
2. The set-top computer of claim 1 and further comprising:
 - a telephone modem coupled to the computer for providing telephone communication to the set-top computer.
3. The set-top computer of claim 1 and further comprising:
 - an input/output interface integrally disposed on the motherboard, and providing an IDE

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connector for connecting IDE devices to the system.

4. The set-top computer of claim 3 and further comprising:

an IDE fixed disk drive coupled to the IDE connector of the input/output interface.

5. The set-top computer of claim 1 and further comprising:

a keyboard with an infra-red transmitter therein, coupled to the infra-red receiver by an infra-red radiation link.

6. The set-top computer of claim 1 and further comprising:

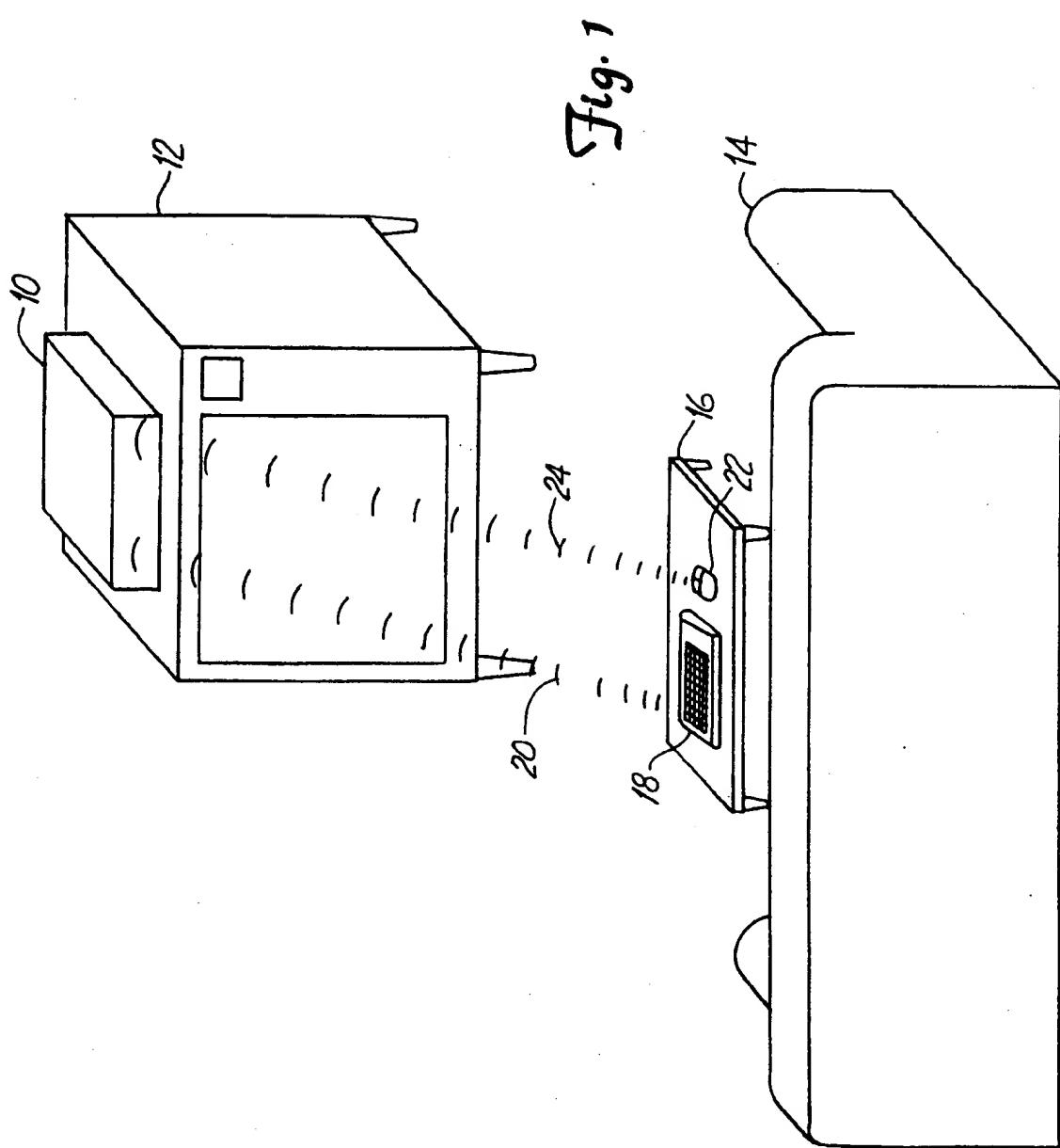
a mouse with an infra-red transmitter therein, coupled to the infra-red receiver by an infra-red radiation link.

7. The set-top computer of claim 1 and further comprising:

a television set operably coupled to the VGA to NTSC converter to receive the NTSC output.

8. The set-top computer of claim 1 wherein the infra-red receiver is integrally disposed on the motherboard.

9. The set-top computer of claim 1 wherein the motherboard comprises a single printed circuit board.



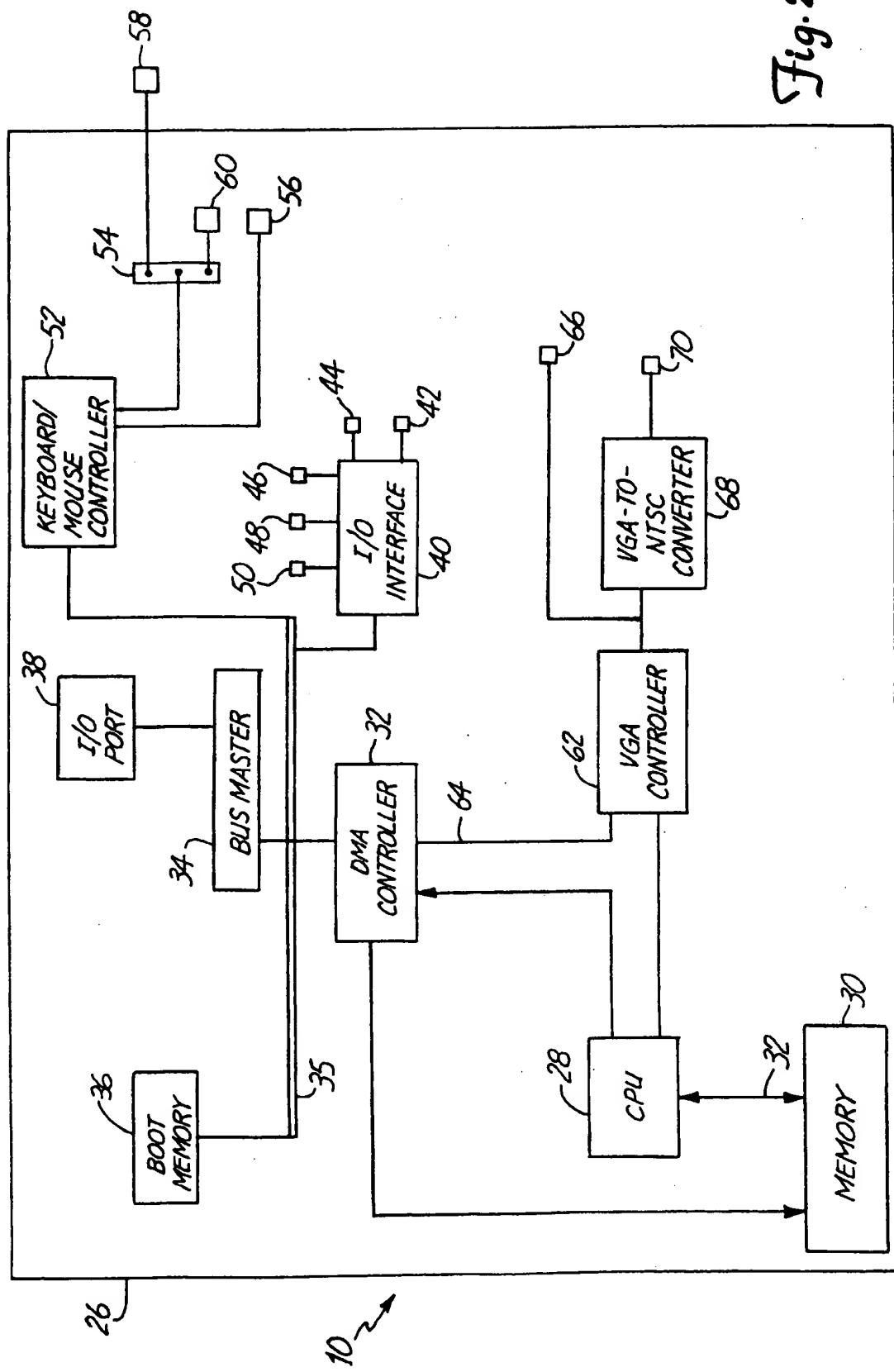


Fig. 2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US97/19252

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :G06F 13/00

US CL :395/863

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 395/863

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

APS, IEEE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,548,340 A (BERTRAM) 20 August 1996, abstract, col. 7, lines 8-16, col. 34, lines 27-48.	1-9
Y	CHANG, HENRY. Entry-level price, good performance. PC USER. 26 July 1995, 26 July 1995, n264, page 55(2). see entire document.	1-9

<input type="checkbox"/>	Further documents are listed in the continuation of Box C.	<input type="checkbox"/>	See patent family annex.
A	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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